

HETERODERA ARTEMISIAE SP. N. (NEMATODA: HETERODERIDAE) - A NEW SPECIES OF  
CYST-FORMING NEMATODE FROM THE PRIMORSK TERRITORY

A.S. EROSHENKO AND I.P. KAZACHENKO

Biological-soil institute, DV Scientific  
Center of the Academy of Science USSR, Vladivostok

Parazitologiya 6(2):166-170 (1972)

A description and illustration are given of the new species of the family Heteroderidae, Heterodera artemisiae sp. n. found on the root system of wormwood (Artemisia rubripes N.) in many regions of the Primorsk Territory.

Surveying the Primorsk Territory for cyst-forming nematodes we found a species of Heterodera very similar to the potato nematode Heterodera rostochiensis. A detailed study of the material revealed that the nematodes we found differed in several characteristics, not only from the potato nematode, but also from all species of this genus. Measurements, drawings, and photographs of the nematode were made from material fixed in lactophenol.

Females (25 specimens) (Fig. 1-3). Body length 0.504-0.650 mm (0.562), width 0.275-0.388 mm (0.345), neck length 0.1-0.11 mm (0.105), stylet length 22.4-23.8  $\mu$ m (23.2), anterior part of stylet 11.9-13.3  $\mu$ m (12.6), distance from dorsal esophageal gland orifice to stylet base 5-6.3  $\mu$ m (5.6), distance from head end to excretory pore 85-128  $\mu$ m (103), median bulb length 24-29.4  $\mu$ m (26.7), width 21-24.5  $\mu$ m (22.2), vulval slit length 3-6.3  $\mu$ m (4.3), fenestra length 10-16.8  $\mu$ m (13.3) distance from anus to outer edge of fenestra 25.2-42  $\mu$ m (31.8)!

The body of the nematode has a rounded posterior end, egg-shaped to almost spherical. Trophic sensory part of the body (so called neck) long, conical. Head with annulated cuticle sharply set off at the level of the stylet base. The first two cuticle annules are larger, the second annule extends beyond the contour of the head end. Stylet long (22-24  $\mu$ m) with a thin shaft and oval knobs with a blunt base. The anterior part of the stylet makes up almost half of its whole length. The dorsal gland duct connects with the lumen of the esophagus at a distance of 5  $\mu$ m (1/4 stylet) from the stylet base. Procorpus of esophagus short. Metacarpal bulb large, oval, 29  $\mu$ m long, 21  $\mu$ m wide, bulb valve length 8.4  $\mu$ m, width 5.6  $\mu$ m. Excretory pore located at the level of the esophagus base, at a distance of 96  $\mu$ m from the anterior end of the body. There are two ovaries. Female cuticle milk-colored, lustreless, darkens to a golden brown color when maturing and changing to cyst. Cuticle in central portion of body 4.9  $\mu$ m thick, in the neck area, 2.4  $\mu$ m. Vulval disc almost a regular circle, fenestra small, 15  $\mu$ m in diameter. Vulval lips thick, semispherical. Vulval slit short. Anus pore-shaped. Cuticle in anus area with star-shaped design. Distance anus - vulva 30  $\mu$ m.

Cysts (25 specimens). Body length 0.414-0.587 mm (0.493), width 0.299-0.575 mm (0.356), neck length 80-138  $\mu\text{m}$  (97), vulval slit length 12-15  $\mu\text{m}$  (13.5), fenestra length 19.8-32.4  $\mu\text{m}$  (24.9), fenestra width 14.4-27.6  $\mu\text{m}$  (23), distance between anus and external edge of fenestra 19.2-46.8  $\mu\text{m}$  (26), ratio of fenestra diameter to distance fenestra-anus 0.8-1.7 (1.0).

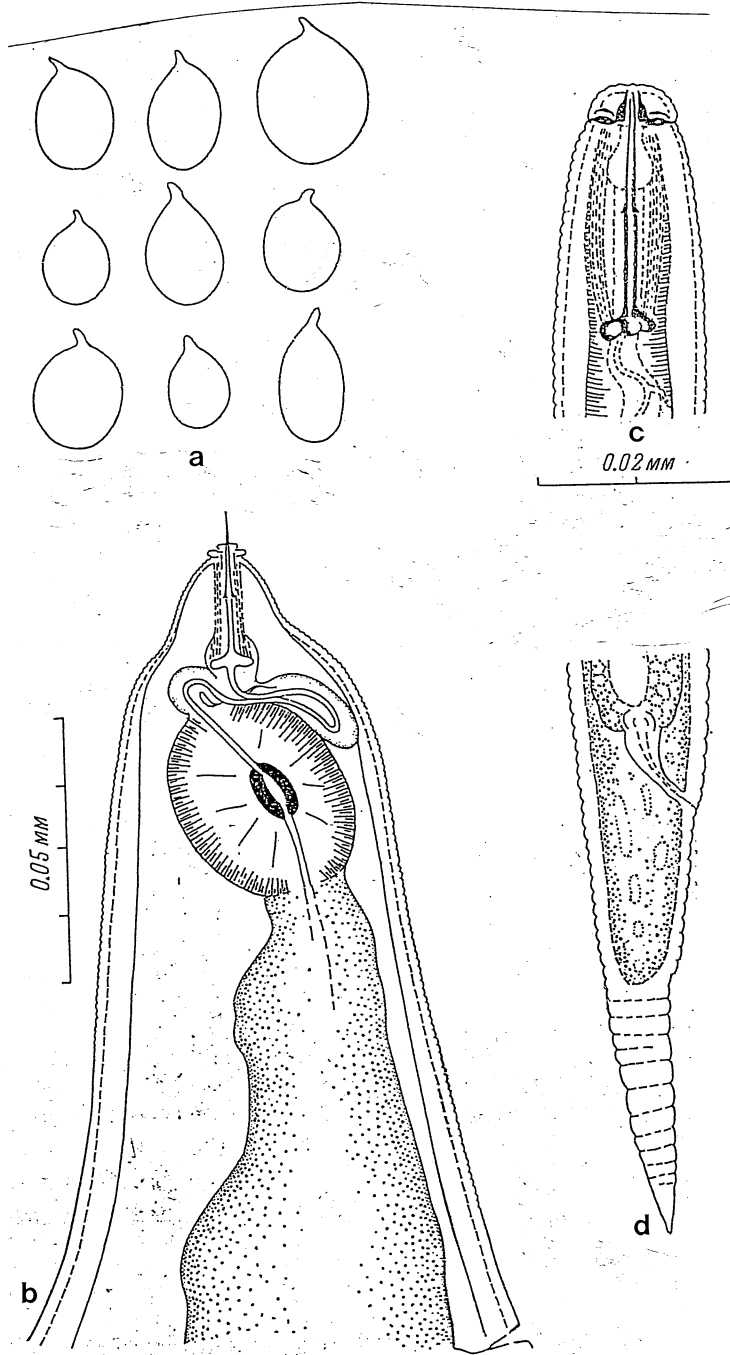


Figure 1. Heterodera artemisiae sp. n

A - Nematode cyst shapes; B - Trophico-sensory part of body (neck);  
C - Head end of larva in second stage of development; D - Tail of larva.

Cyst rounder than females, light brown to dark brown. Cuticle with thick zig zag folds in vulval area and anal area, and smaller and more regular ones at the head end. Vulval disc of a lighter color on the cuticle background. The folds are star-shaped in the anal area. There are no bullae. The species belongs to the circumfenestrate group of Heterodera.

Larva (second stage) (25 specimens). Body length 0.357-0.490 mm (0.413), a = 21.2-26.8 (23.3), b = 2.4-4.9 (3.3), c = 6.1-14(9.6). Tail length 33-64  $\mu\text{m}$  (40), terminus 18-28  $\mu\text{m}$  (23), stylet 18-29  $\mu\text{m}$  (22.6), length of frontal part of stylet 9.8-14  $\mu\text{m}$  (11.8). Ratio of terminus length to length of tail 1.2-2.6 (1.6).

Body of larvae worm-shaped, streamlined, narrowing sharply toward the tail end; cuticle with large annulation. Lateral field consists of four lines, not crossed by the annules; width of lateral field equals 1/4 of body diameter. Head end not clearly separate from body contour; skeleton strongly sclerotized. Stylet well-developed, with oval basal knobs; anterior part of stylet somewhat longer than posterior part. Procorpus of esophagus narrowing toward the base; metacorpul bulb oval with a well-developed valve. Esophageal glands long lying ventrally over the intestine. Cephalids at level of ninth cuticle annule from front end of body. Nerve ring below the median bulb at a distance equal to the length of the bulb. Excretory pore located 88  $\mu\text{m}$  from head end. Hemizonion close to the excretory pore (above it). Tail conical, with long, pointed sharp terminus. Terminus with large cuticle annules, length - more than 1/3 of tail length.

Eggs. Length 69-114  $\mu\text{m}$  (98.7), width 33-60  $\mu\text{m}$  (44.7), ratio of egg width to length 1:2. No male found.

Holotype: females, body length 0.65 mm, width 0.275 mm, neck length 110  $\mu\text{m}$ , stylet 22.4  $\mu\text{m}$ , lumen of dorsal gland duct located at a distance of five  $\mu\text{m}$  from the stylet base; length of metacorpul bulb 29  $\mu\text{m}$ , width 21  $\mu\text{m}$ , excretory pore located 96  $\mu\text{m}$  from anterior body end; length of vulval slit 4.2  $\mu\text{m}$ , length of fenestra 14  $\mu\text{m}$ , width 10  $\mu\text{m}$ , distance from anus to fenestra 30  $\mu\text{m}$ .

Slides with holotype (No. NP-1) and paratypes (No. N.P.-2 - N.P.-25) are kept at the Department of Parasitology of the Bio-Soil Institute DV of the Science Center of the Academy of Science USSR.

Host-plant: H. artemisiae sp. n. was found on the root system of red-hefted wormwood (Artemisia rubripes Nakai, family Compositae). Type locality: 224th kilometer of Far Eastern Railroad of Khazan region; City of Nahodka-Cape Astaf'eva; settlements Serafimovka, Margaritovo, Milozadovo of Ol'ginski region Primorsk Territory.

Differential analysis: The described species relates to the group of Heterodera having a rounded posterior end, without an anal-vulval cones. This group contains six nematode species: Heterodera leptonepia Cobb & Taylor, 1953; H. millefolii Kir'yanova & Krall', 1965; H. punctata Thorne, 1928; H. rostochiensis Wollenweber, 1923; H. tabacum Lownsbery, 1954; H. virginiae Miller & Grey, 1968.

The absence of a description of the female and unsatisfactory description of the cysts of H. leptonepia given by Cobb and Taylor, 1953, does not allow us to compare these stages of the above-mentioned species of nematodes. Obvious differences with this species appear in the description of the larvae: H. leptonepia is 1.5 times longer and thinner than the described species; the dorsal gland duct joins the esophagus lumen 12  $\mu$ m (2.3 of length of stylet) below the base of the stylet in H. leptonepia, whereas in H. artemisiae - 5  $\mu$ m (1/3 of length of stylet) below the base of stylet; the tail in H. leptonepia is less than 1/3 of its length, in the described species - half of tail length.

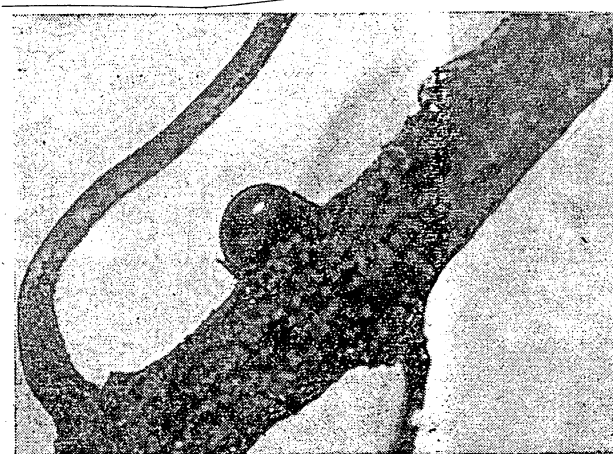


Figure 2. Female nematodes on roots of wormwood (x 25).

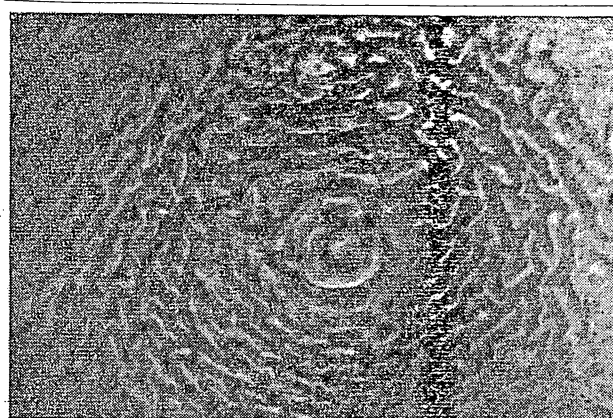


Figure 3. Anal-vulval disc of female (x 970).

In dimensions and shape of body of the females H. artemisiae resembles H. millefolii described by Kir'yanova and Krall' (1965) in Estonia. These species differ in the bulb location of the excretory pore (in H. millefolii it is located at level of median in H. artemisiae at level of the esophageal base), the diameter and structure of vulval disc, greater distance between anus and fenestra in the new species and longer eggs in H. millefolii.

From H. punctata the described species differs in the structure of the anus: the former species has a fenestrated anus, H. artemisiae has a pore-like anus.

The described species is very close to H. rostochiensis and H. tabacum. It differs from the first by having smaller cysts, rougher cuticle folds in the area of the anal-vulval disc, ratio of diameter of fenestra to the distance anus-fenestra: 2.7-8.9 (4.6) in H. rostochiensis and 0.8-1.7 (1.0) in H. artemisiae. The new species differs from H. tabacum by having a more oval body shape in females and cysts, a smaller number of offset cuticle annules at the head end of females (two in H. artemisiae and three in H. tabacum), spherical form of fenestra (H. tabacum has ellipsoid fenestra), and ratio of the diameter of fenestra to the distance anus-fenestra: 0.9-2.8 (1.5) in H. tabacum and 0.8-1.7 (1.0) in H. artemisiae.

H. artemisiae is identical with H. virginiae in the shape of the cysts and the structure and dimensions of larvae. The described species has smaller body dimensions in females, short vulval slit (4.3  $\mu$ m: 9.2  $\mu$ m) and ratio of diameter of fenestra to the distance anus-fenestra is 1.5-4.2 (2.8) in H. virginiae, it is 0.8-1.7 (1.0) in H. artemisiae.

Besides that, H. artemisiae differs from all other cyst-forming nematodes in the host-plant on which this species develops.

#### LITERATURE

- Kir'yanova, E. S. & Krall', E., 1965. [The milfoil cyst nematode - Heterodera millefolii n. sp. (Nematoda: Heteroderidae).] Eesti NSV Tead. Akad. Toim., Biol. Ser. 14(3):325-328.
- Cobb, G. S. & Taylor, A. L., 1953. Heterodera leptonepia, n. sp., a cyst-forming nematode found in soil with stored potatoes. Proc. helminth. Soc. Wash. 20(1):13-15.
- Lownsbery, B. F. & Lownsbery, J. W., 1954. Heterodera tabacum new species, a parasite of solanaceous plants in Connecticut. Proc. helminth. Soc. Wash. 21(1):42-47.

Miller, L. I. & Gray, B. J., 1968. Horsenettle cyst nematode, Heterodera virginiae n. sp., a parasite of solanaceous plant. Nematologica 14(4):535-543.

Thorne, G., 1928. Heterodera punctata n. sp. a nematode parasite on wheat roots from Saskatchewan. Scien. Agric. 8(11):707-711.

HETERODERA ARTEMISIAE SP. N. (NEMATODA: HETERODERIDAE),  
A NEW SPECIES OF CYST-FORMING NEMATODES  
FROM THE PRIMORJE TERRITORY

A. S. Eroshenko and I. P. Kasachenko

S U M M A R Y

*Heterodera artemisiae* sp. n. was found on the root system of *Artemisia rubripes* N. in the Primorje Territory. The species is close to the group of heteroderids with a rounded posterior end, without a protruding anal-vulvar conus. It differs from allied species in a plant-host and in a number of morphological characters in the structure of females and larvae.